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ABSTRACT

The summer "bridge" part of the Special Transitional Enrichment Program (STEP) at the University of California (UC), Davis, was evaluated with attention to first-year academic performance and retention. STEP, part of the Educational Opportunity Program (EOP), is an orientation and academic program to help low-income and minority students make the transition to the university curriculum. A comparison was made of specially-admitted freshmen who attended summer STEP (group A) with those who began STEP in the fall (group B). Findings include: among the fall 1978 EOP special action freshmen who completed their first year at UC Davis, group A had lower high school grade point averages (GPA) and lower Scholastic Aptitude Test (SAT) math scores on the average than group B; group A students did as well academically as the academically better-prepared Group B students; total SAT scores carry negligible weight in predicting first-year college GPA and retention for these EOP specially-admitted freshmen; summer STEP participation does not significantly affect first-year college GPA after correcting for the influences of students' academic background/workload; and participation in summer STEP significantly affects retention as measured by quarters enrolled. (Author/SW)

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STUDY OF THE 1978 SUMMER STEP

The Summer "Bridge" Program at the Learning Skills Center, University of California, Davis

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Study of the 1978 Summer STEP
Executive Summary

This paper examines one aspect of the Educational Opportunity Program (EOP) at UC Davis, the summer "bridge" portion of the Special Transitional Enrichment Program (STEP). The purpose of the study is to assist policy evaluation by providing first-year academic performance and retention information. It further seeks to identify the type of program participant most likely to gain maximum benefit from the program.

The major findings are as follows:

1. Among the Fall 1978 EOP special action freshmen who completed their first year at UC Davis, those who participated in summer STEP (Group A) had lower high school GPA's and lower SAT math scores on the average than students who began their STEP participation in the Fall (Group B).

2. Group A students did as well academically at UC Davis (as measured by first-year college cumulative GPA) as the academically better-prepared Group B students.

3. Total SAT scores carry negligible weight in predicting first-year college GPA and retention for these EOP special action freshmen.

4. Summer STEP participation does not have a statistically significant effect on first year college GPA after correcting for the influences of students' academic background and academic workload through covariance analysis.

5. Summer STEP participation does have a statistically significant effect on retention as measured by number of quarters enrolled after correcting for the influence of students' academic background through a covariance analysis.

6. Unavoidable weaknesses in the study design hamper interpretation of these covariance analyses.

7. The relationship between retention and summer STEP participation is particularly strong for those students with the weakest preparation for college.

8. Late admissions and retention appear to have a strong, inverse relationship. This finding is tentative because the sample size is small but it warrants further investigation.

The results emphasize the importance of summer STEP participation, especially for those with poor high school records. The results also indicate that Fall admission notices for EOP special action freshmen should be dated no later than August 1, and that alternative admission criteria should be explored for this population. Further study is recommended.

Study of the 1978 Summer STEP

INTRODUCTION

This paper examines one aspect of the Educational Opportunity Program (EOP) at UC Davis, the summer "bridge" portion of the Special Transitional Enrichment Program (STEP). This examination is a necessary step in the development of an evaluation mechanism "capable of (1) demonstrating the relationship of support services to student success and (2) identifying necessary services and the most effective means of delivering those services" ("UC Student Affirmative Action Plan", p. 39) [1].

Historical Perspective

In the atmosphere of the Civil Rights Movement and the Great Society of the 1960's, higher education moved to meet the goal of equal access for all students regardless of social and economic backgrounds [2]. Recognizing that certain secondary school students were also disadvantaged academically because of inadequate preparation for college, California's postsecondary education system implemented compensatory and remedial programs to assist those students from disadvantaged backgrounds who had the interest and academic potential to attend college [3]. Most notable of these programs were Educational Opportunity Program (EOP) and Educational Opportunity Program and Services (EOPS).

The University of California, in an effort to expand postsecondary educational opportunities for minority and disadvantaged students, established an Educational Opportunity Program in 1964. The primary objectives of EOP were to recruit and retain students from underrepresented minority groups and economically disadvantaged backgrounds. The program attempted both to improve educational and occupational access for these students and to increase the cultural diversity of the campuses [4].

Programmatic Context

In 1966 an EOP organization was established at UC Davis. The program components included recruitment and pre-admissions advising, admissions assistance, orientation and academic enrichment, financial aid, and academic and non-academic support services [5].

While the goals of EOP continue to be substantially the same, the organizational structure has changed over time. For example, early efforts at improving the pool of high school students eligible for admission to the University focused on senior high school students. More recently, it has been recognized that educational motivation and academic preparedness need to be stimulated much earlier and new emphasis has been placed on outreach to junior high school students.

Another example of structural changes in EOP involves student support services. While EOP support services were initially centralized, gradual modification in this organization occurred as EOP support services were integrated with campuswide student support services. The impetus for this reorganization was twofold: (1) regular service units needed to be sensitive and responsive to the particular needs of EOP students, who should not be segregated from the mainstream of the campus; and (2) inflationary pressure required that student services be more cost effective [1]. The operational modes for program elements of EOP remain evolutionary in nature and continue to change over time.

Historical changes in the enrollment and retention of students from underrepresented minority groups and disadvantaged backgrounds is well documented. The enrollment and graduation ratio for these students remain lower than would be implied by statewide demographic data [6]. In the 1970's several University wide task forces examined the problems of access and retention of these students and issued recommendations for remediation. These efforts culminated in the production of the University's Student Affirmative Action Plan, which describes existing barriers and the action plans for overcoming them [1].

Development of STEP

The Special Transitional Enrichment Program (STEP) at UC Davis is an orientation and academic program that helps low-income and minority students make the transition to the University curriculum. STEP replaced an earlier program, the eight-week Summer Enrichment Program (SEP). In 1975, SEP was subjected to a thorough evaluation, including budget analysis, a student satisfaction survey and statistical analysis of the impact of SEP on college academic performance. The SEP Evaluation Task Force recommended a number of changes; the resulting program was STEP [7].

The objectives of STEP are: (1) to assist students to strengthen their learning skills and study habits in areas where improvement is needed, (2) to enhance students' readiness to do University work by providing a week of orientation and three weeks of instruction prior to the fall quarter, and (3) to assist students' adjustment to the Davis campus by providing living /learning experiences in residence halls and general orientation to campus life [8].

Program Description

According to the 1978 Summer STEP bulletin, all special action (freshmen and transfer) students were required to participate in STEP. For budgetary reasons, this requirement was applied only to EOP special-action admits. Students were expected to begin participating in the program August 20th, unless given a waiver, which was usually granted on request. Those students who began the program on August 20th belonged to STEP Group A. Those who began the program in October were STEP Group B.

The summer program for Group A began with a campus orientation and Summer Advising, but the major part of the program was the academic component, which included classes in mathematics, writing, reading, study skills, and, for those who needed and qualified for it, pre-Chemistry [8]. Students in STEP Group B may or may not have attended the Summer Advising and Registration Conference or received a campus orientation in the fall. They could enroll in STEP English and math classes during the school year as space permitted. Tutoring and workshops were available to all STEP students during the academic year.

STEP has been in operation three years, during which time a vast amount of data has been collected on STEP students and their level of participation. A cursory examination of STEP participation data suggests that students who participate in the STEP summer program are more likely to persist at Davis and to perform better academically than those who do not participate. On the basis of this data, the Academic Senate Committee on Admissions and Enrollment recently recommended that all EOP special action admits be required to attend summer STEP. The primary obstacles to implementing this recommendation are budget constraints and students' conflicting needs and obligations.

STEP has earned a strong reputation for assisting students whose academic skills need strengthening to cope with the University curriculum. But tightening budgets and spiralling costs require the efficient use of program funds. If STEP is to meet the needs of its students and of the University, it must identify the most effective program elements and those student users most likely to receive maximum benefit from the program. The intent of this study is to examine program elements and participant characteristics which maximize program impact on students' academic performance and retention. This study represents the initial phase in the development of a comprehensive policy evaluation effort.

STUDY OBJECTIVES

The current study examines two questions: (1) Does STEP summer participation relate to improved academic performance in college work? (2) What student subpopulations are most likely to benefit from STEP?

METHODOLOGY

Study Replication

This study replicates the statistical design used in the evaluation of SEP in 1975. Using analysis of covariance, it examines the extent to which summer STEP participation relates to retention and to better academic performance in college. The SEP study found that a regression model that included participation in SEP, high school GPA and total CEEB scores was adequate. The model used for this study allows for prediction of first year college cumulative GPA and of retention from summer STEP participation controlling for the entry characteristics of high school GPA and total SAT scores. The multiple regression approach described by

Kerlinger and Pedhazur [9] was used for the covariance analysis. Descriptive statistics and regression analyses were generated using BMDP programs [10].

Population Identification

The study population is EOP special action admits for Fall 1978 (the most recent class for which comprehensive information is available). Descriptive information was generated from the UCD Composite Undergraduate File (CUF) updated through Spring 1979.

Because academic programs varied, there was no one core of classes taken by all students. To standardize somewhat the course work undertaken, two restrictions concerning the study population were made: (1) students had to have taken a minimum of nine courses in their first year; (2) only entering freshmen were included. A further rationale for excluding transfer students from the study was that the SAT scores of transfer students were often missing from their records. These restrictions paralleled those in the SEP study.

Students were eliminated from the study population if: (1) they had withdrawn prior to completion of the Spring quarter, (2) SAT scores or high school GPA's were missing, and (3) they had not completed at least nine academic classes (excluding physical education and military science courses). Thus, the study population is composed of 43 STEP Group A freshmen and 26 STEP Group B freshmen from the EOP special action population.

RESULTS

STEP A & B Comparisons

Because STEP's service delivery has been altered to allow all EOP special action students nominal participation, comparisons of groups is somewhat complicated. This series of analyses compares those EOP special action freshmen who attended summer STEP--Group A--with those who began STEP in the Fall--Group B. These groups are not random samples from the same population. Summer STEP participation depended on date of admission and students' willingness to participate. Table 1 shows the distribution of the STEP A and B groups included in this study by the month in which their admission notice was dated.

Table 1

Distribution of STEP A and B Students by Month of Admission Notice
(in percent)

	April	May	June	July	August	Sept.	Total
STEP A (n = 41*)	65.9	19.5	14.6				100.0
STEP B (n = 26)	19.2	3.8	19.2	46.2	11.6		100.0

* 2 missing cases

Note: See Appendix A for distribution of entire 1978-79 freshmen EOP special action admits by month of admission notice.

The background characteristics of these two groups were compared. The age and ethnicity of students in these two groups are essentially the same, and all come from the same geographic area--California. Group A was only 35 percent male while Group B was 58 percent male; while this difference was not statistically significant, it does suggest that females may be more likely to be available for a summer bridge program.

The academic backgrounds of the students in the two groups were different. The average high school GPA for the students in Group A was 2.72 while that of Group B was 2.98. This difference is statistically significant; the probability of such a difference occurring by chance is about one in a hundred. No statistically significant difference existed between average verbal SAT scores for the two groups; Group A's average verbal SAT score was 375.8 while Group B's was 383.8. However, average SAT math scores were significantly different for the two groups; the average SAT math score was 414.4 for Group A and 477.7 for Group B.

While Group B appeared to be better prepared academically for college, their actual college performance was no better than that of Group A. Average cumulative GPA after one year of enrollment was 2.273 for Group A and 2.241 for Group B, not a statistically significant difference. In spite of poorer pre-college academic credentials, Group A does as well as Group B in college academic performance.

A number of potential explanations are possible: (1) Summer STEP provides sufficient remedial and compensatory educational experiences to enable STEP A students to perform at a level equal to that of the better prepared STEP B students. (2) STEP A students carry fewer units in less difficult classes than STEP B students resulting in comparable GPAs. (3) Differential use of STEP services during the academic year accounts for the performance rates of STEP A and B students. Evidence related to the first two explanations is examined in this report. The investigation of the third possible explanation will have to be covered in a subsequent report.

Summer STEP and First-Year GPA

The first proposed explanation is that summer STEP participation makes a critical difference in first year college academic performance. Covariance[1] analysis is the appropriate analytic tool for investigating this hypothesis. The analysis of covariance provides a model for predicting the response variable, first year college GPA, from summer STEP attendance after controlling for entering academic characteristics, high school GPA and total SAT scores. These variables were selected to replicate the earlier SEP study and for the predictive value of the covariates which are known before college work begins. High school GPA and SAT scores serve as major determinants for admission. If their role in determining first year academic performance could be quantified, such information might be useful in estimating variations in students' successes at UCD.

After correcting first-year college academic performance at UC Davis for the influence of student's academic background (as evidenced by high school GPA and SAT scores), summer STEP for this group of students does not have a statistically significant effect on college performance. Knowledge of student's participation in summer STEP does not significantly improve one's ability to predict student's first-year GPA. Students' GPA's vary as much within Group A and Group B as they do between the two groups. A complete description of this analysis and its results appear in Appendix B.

Academic Workload

Another suggested explanation is that STEP Group A freshmen carry fewer units in less difficult classes than STEP Group B students resulting in comparable GPA's. The average total units recorded on transcripts for the first three quarters of college were 30 units for Group A and 34 units for Group B. The difference between recorded academic units for these two groups is statistically significant ($p<.05$). No significant difference exists between the two groups in number of pass/no pass units. Thus, the difference is a reflection of the number of academic course units taken for a grade.

The effects of summer STEP participation on first year college GPA were reanalyzed controlling for academic course load (total number of units) in addition to the two covariates already studied. Summer STEP participation does not have a statistically significant impact in the prediction of first-year college GPA, even when the effects of students' academic backgrounds and total academic unit loads have been controlled for statistically. A summary of this covariance analysis appears in Appendix C.

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[1]Note: Analysis of covariance assumes random assignment of subjects to groups or, at a minimum, random assignment of treatments to groups. Because randomization was not possible, the results of these analyses should be viewed with caution.

Summer STEP and Retention

A recent study of retention at UC Davis suggests that minority students with poor grades tend to persist longer than other students with comparable academic performances [11]. Perhaps GPA is an inadequate or inappropriate measure of successful adaptation to college curricula for this population. A more relevant gauge may be persistence as measured by the number of quarters enrolled.

Retention after three and five quarters was examined for these subgroups. Of the 99 Fall 1978 EOP special action freshmen whose files appeared on CUF, 60 of the 63 STEP Group A students completed the Spring quarter of their first year as did 30 of the 36 STEP Group B students. A chi-square analysis indicates a positive statistical association between summer STEP participation and persistence through three quarters ($x^2=3.92$, $p<.05$).

By the fifth quarter 16 Group A students and 14 Group B students had dropped out. The chi-square for this distribution was nonsignificant; summer STEP participation and persistence through five quarters were statistically independent categories.

A covariance analysis, with retention measured by number of quarters enrolled as the dependent variable, was undertaken. This analysis examined the relationship between summer STEP participation and persistence, controlling for entry level academic characteristics. After controlling for the influences of students' academic entry characteristics, summer STEP attendance does have a statistically significant effect on retention for the first five quarters for this group of students. A description of this covariance analysis appears in Appendix D.

DISCUSSION

Participation in summer STEP exposes Group A students to the full range of campus support services available at a time when regular academic year pressures are not yet competing for their attention. These students have the opportunity to establish relationships with their EOP counselors, faculty advisors, LSC staff, and other students, thus building social and academic support systems that may be essential to success at UC Davis. Quantitative estimates of the impact of these social factors are difficult to conceptualize and would need to be measured during the actual program, at the latest before the end of the third quarter, to be reasonably accurate. Determination of the extent to which these factors, rather than the academic components of summer STEP, are plausible explanations for comparable academic performance by Group A and Group B students requires further study.

Lack of Randomization

Due to unavoidable design weaknesses, caution is urged in the interpretation of study findings. Lack of randomization of subjects makes the results of the covariance analyses open to question.

The following factors undermine the assumption of random distribution of subjects: (1) More than half of the students in Group B were not admitted until July or later and, thus, attendance at summer STEP was not an option for these students. (2) Students admitted before July who chose not to attend summer STEP may differ significantly from those who chose to attend. Differences might include level of financial support, motivation to learn, or social and academic support systems outside STEP [7]. Because these students are self-selected, there is no basis for the assumption that these factors are randomly distributed across the two populations.

The elements of timely admissions and self-selection imply certain qualitative differences between the two subgroups. While Group A students generally have lower entry qualifications, they also complete their admissions cycle earlier than Group B students. No definitive information is available about why this happens. The fact, however, suggests several possible explanations. Group A students have made an early, firm commitment to their postsecondary education. Because of this commitment, they are willing to invest more effort into being successful, as evidenced by the early completion of the application process and their willingness to start school a month early.

Countervailing Forces

Experiences during the academic year are likely to affect the response variables, UCD GPA and retention. During this period the distinction between STEP Group A and Group B becomes blurred. Students in Group B can enroll in STEP English and math classes if space allows. They have access to tutoring and workshops on an equal basis with Group A students during the school year. One could hypothesize that Group A students should do better because they are exposed to the full complement of STEP services. A detailed examination of STEP service usage is needed for a more accurate description of school year STEP activities and their impact on first year academic performance and retention.

Some of the hypotheses to be tested in such a study would have ramifications on the current results. These hypotheses include: (1) STEP Group A students utilize services during the academic year to a greater extent than Group B students, and (2) service users perform significantly better academically and persist longer than nonusers. These hypotheses, if upheld, would suggest that while summer STEP attendance alone is not critical in accounting for variations in first year academic performance, summer attendance coupled with continued remedial assistance throughout the school year may make a critical difference.

Academic course loads for Group A and Group B students are also different. Group B students carry significantly more academic units, but no information is available as to why this occurs. Perhaps Group B students carry heavier loads because they lack adequate advising or because they are more confident in their ability to manage college work. If Group B students had had the same breadth and depth of counseling and advising as Group A

students, including diagnostic testing and faculty advising, they might have received adequate information about alternative course enrollment and their own competency to organize their efforts more effectively and thereby achieve better academic results.

The absence of an uncontaminated, randomly selected control group may dilute true summer STEP effects and put the validity of the covariance analysis in question. Countervailing forces of pre-college academic preparation and academic workload appear to operate across the two comparison groups and use of support services during the school year influences first year academic performance across groups in an indeterminate way. Clarification of the impact and interaction of these forces is needed for a comprehensive evaluation of STEP.

Summer STEP participation appears to contribute significantly to student retention but not to significantly better academic performance as measured by GPA. While these analyses do not provide statistically conclusive evidence of STEP impacts due to unavoidable design weaknesses, they do suggest further investigations of program and participant characteristics.

Optimum Service Population

A commonly postulated hypothesis is that students with the poorest academic preparation for college have the greatest need for remedial assistance and, thus, gain the greatest benefit from such a program. To investigate this proposition, admissions data for Fall 1978 EOP special action freshmen were analyzed.

In Fall 1979 a formula for special action admissions was instituted at UC Davis Appendix E). Using a combined criteria of high school GPA and A-F subject omissions, the Director of Admissions was authorized to admit through special action any student meeting certain baseline criteria. Special action applicants whose GPA and subject omissions fell below this baseline were reviewed by the Subcommittee on Special Action Admissions for admission authorization. These minimum criteria were applied retroactively in this study to the Fall 1978 EOP special action freshmen. Group I are students in STEP Group A who would not have met the minimum criteria for admission by special action and Group II are those in STEP Group B who would not have met the criteria. Their distribution by status of enrollment after five quarters is presented in the following table.

Table 2

Enrollment Status After Five Quarters Of EOP Special Action Freshmen Who Would Not Have Met Minimum Admission Criteria

	Enrolled	Not enrolled	Total
Group I (STEP A)	12	3	15
Group II (STEP B)	4	6	10

Note: See Appendix F for distribution of qualified special action freshmen by enrollment status.

While it has been determined that summer STEP participation and persistence through five quarters are statistically independent for these groups as a whole, the relationship does exist between persistence through five quarters and summer STEP for these students with the poorest academic entry characteristics appears quite strong. Sixty percent of STEP Group B freshmen in this category leave UC Davis by their fifth quarter while only 20 percent of those students with similar backgrounds who attend summer STEP leave. While this is a very small sample, the results argue strongly for further investigation in this area and possible policy revisions.

An alternative hypothesis often raised is that students with better academic qualifications are more likely to gain maximum benefit from a remedial program. In the study's population, the students with the better entry credentials did not participate in summer STEP. An adequate investigation of this hypothesis requires a critical analysis of the full range of STEP services and levels of service usage by these subgroups of students. This examination should be included in a future study of STEP service usage.

Late Admissions

During the analysis of admissions qualifications and retention, the effects of late admission were coincidentally examined. All EOP special action freshmen admitted in September dropped out by the fifth quarter. Of those admitted in August, fifty percent had dropped out. Of those students whose admissions notice was dated June or earlier only 26 percent had dropped out. Because of the small sample size, these findings are tentative at best, but would seem to demand further study. The rationale for late admissions is to provide these students with every opportunity to gain entrance. However, if the odds against continued enrollment are so great, this opportunity may be of negative value to these students.

SUMMARY OF FINDINGS

1. Among the Fall 1978 EOP special action freshmen who completed their first year at UC Davis, those who participated in

summer STEP (Group A) had lower high school GPA's and lower SAT math scores on the average than students who began their STEP participation in the Fall (Group B).

2. Group A students did as well academically at UC Davis (as measured by first-year college cumulative GPA) as the academically better-prepared Group B students.

3. Total SAT scores carry negligible weight in predicting first-year college GPA and retention for these EOP special action freshmen.

4. Summer STEP participation does not have a statistically significant effect on first year college GPA after correcting for the influences of students' academic background and academic workload through covariance analysis.

5. Summer STEP participation does have a statistically significant effect on retention as measured by number of quarters enrolled after correcting for the influence of students' academic background through a covariance analysis.

6. Unavoidable weaknesses in the study design hamper interpretation of these covariance analyses.

7. The relationship between retention and summer STEP participation is particularly strong for those students with the weakest preparation for college.

8. Late admissions and retention appear to have a strong, inverse relationship. This finding is tentative because the sample size is small but it warrants further investigation.

RECOMMENDATIONS

This study examines two effects of STEP: first year UC Davis GPA and retention through five quarters. While these analyses provide interesting comparisions within and between Group A and Group B students, they yield only broad suggestions for change: (1) all EOP special action freshmen who must be admitted by committee should be required, as a prerequisite for Fall enrollment, to attend summer STEP; and (2) no EOP special action freshmen should be admitted later than August 1.

To suggest that a four week summer program or even a freshmen year remedial program is sufficient to overcome the disadvantages of a lifetime is unrealistic. This student population is no less heterogeneous than other student groups. Each student brings a unique combination of strengths and weaknesses to the campus. Defining a set of services that will assist each student to maximize his/her success on campus is an important objective. A review of service usage will be the focus of a future STEP report.

FUTURE STUDIES

This study produces as many questions as answers. Some of the most pressing questions are listed below and indicate areas for further study.

1. Because summer STEP is not the critical factor in determining variations in first year college GPA, what factors enable the less well prepared Group A students to do as well academically as the better prepared Group B students?

2. How do Group A and Group B students differ in STEP service usage during the school year and how does service usage relate to improved academic performance?

3. Does the impact of summer STEP participation on retention continue throughout the student's time on campus or, as seems more reasonable, does it dissipate over time? If it does dissipate, what support is or should be available to these students as they encounter an increasingly complex and competitive academic experience?

4. Do the findings of this study regarding academic performance and retention apply also to EOP special action transfer students, EOP regular admit students, or Non-EOP special action students?

5. What is the relationship between the timing of the admissions cycle and retention?

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APPENDIX A
Distribution of Fall 1978 Freshmen EOP Special Action
Admits by Month of Admission Notice
(in percent)

	April	May	June	July	August	Sept.	Total
STEP A (n=57, 6 missing cases)	61.4	21.1	15.8	1.7	-	-	100.0
STEP B (n=35, 1 missing case)	14.3	2.9	20.0	45.7	11.4	5.7	100.0

APPENDIX B
Analysis of Covariance #1

Prediction of first year UCD GPA from summer STEP participation controlling for high school GPA and total SAT scores.

Response variable	Y = first year UCD GPA
Independent variable	X_1 = summer STEP participation
Covariate 1	X_2 = high school GPA
Covariate 2	X_3 = total SAT scores

The analysis of covariance pursued here postulates the following full regression model:

$$Y_i = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + \varepsilon_i$$

where $i = 1,...69$ and where ε_i are independent, normally distributed variables with mean zero and common variance σ^2. This model postulates that the effects of STEP participation are additive (i.e., the influence of the covariates in the regression function does not depend on participation in summer STEP).

The analysis of covariance requires the regression weights of the covariates, B_2 and B_3, not to be significantly different when predicting the response variable Y for each group. Equality of regression coefficients for STEP Group A and Group B were tested.

$$Y_{\text{STEP A}} = .58 + .117X_2 - .0009X_3$$

$$Y_{\text{STEP B}} = 0.56 + .141X_2 + .0014X_3$$

No significant differences were found between these regression weights. Thus, the use of common regression weights for the covariance analysis was appropriate.

To investigate the influence of STEP, it was hypothesized that STEP had no influence on first year college GPA (i.e., $B_1 = 0$), which generates the following model:

$$Y_i = B_0 + B_2X_{2i} + B_3X_{3i} + \varepsilon_i$$

When the source of variation due to this restricted model is removed from the full model stated earlier, the source of variance due to STEP participation remains. If the amount of variance accounted for by STEP is significant, the hypothesis $B_1 = 0$ is rejected. Thus, the full model significantly improves one's ability to predict first year college GPA and B_1 would measure the impact of summer STEP attendance on first year college GPA. The following table summarizes this analysis:

ANALYSIS OF COVARIANCE #1

Source of variation	d.f.	Sum of Squares	Mean Square	F
Due to Regression-- Restricted model	2	0.7288	0.3644	
Due to Regression-- Full minus Restricted	1	0.4418	0.4418	1.54
Deviation from Regression	66	18.886	0.286	
Total	69	20.057		

The F statistic is not significant at $p \leq .05$; therefore the hypothesis that STEP has no influence on first year college GPA cannot be rejected.

APPENDIX C
Analysis of Covariance #2

Prediction of first year UCD GPA from summer STEP participation controlling for high school GPA, total SAT scores and total number of units.

The expanded full model has the following form:

$$Y_i = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + \varepsilon_i$$

where X_4 is total number of urits and where effects of independent variables are assumed to be additive.

The hypothesis to be tested is that summer STEP participation does not account for a significant portion of the variance in GPA between groups even when entering academic characteristics and number of units are controlled. The following table summarizes this analysis:

ANALYSIS OF COVARIANCE #2

Source of variation	d.f.	Sum of Squares	Mean Square	F
Due to Regression-- Restricted model 2	3	6.0089	2.003	
Due to Regression-- Full minus Restricted 2	1	0.5808	0.5808	2.803
Deviation from Regression	65	13.467	0.2072	
Total	69	20.057		

The F statistic is not significant at $p \leq .05$; therefore, the hypothesis cannot be rejected.

APPENDIX D
Analysis of Covariance #3

Prediction of retention (number of quarters enrolled) from summer STEP participation, controlling for high school GPA and total SAT scores.

Response variable	Y = number of quarters enrolled
Independent variable	X_1 = summer STEP participation
Covariate 1	X_2 = high school GPA
Covariate 2	X_3 = total SAT scores

A log transformation was performed on the dependent variable because the relationship between the untransformed dependent variable and the independent variable and covariates appeared curvilinear with a consistently increasing slope. Such a transformation is intended to improve the linearization of the regression model so that it more closely conforms to the linear regression model assumptions.

The full regression model has the following form:

$$Y_i = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + \varepsilon_i$$

where Y_i now represents the number of quarters enrolled. The influence of STEP on retention is investigated by assuming STEP has no influence (i.e., $B_1 = 0$), which generates the following restricted model:

$$Y_i = B_0 + B_2X_2 + B_3X_3 + \varepsilon_i$$

The following table summarizes the results of this covariance analysis.

ANALYSIS OF COVARIANCE #3

Source of variation	d.f.	Sum of Squares	Mean Square	F
Due to Regression-- Restricted model	2	.04670	.02335	
Due to Regression-- Full minus Restricted	1	.05534	.05534	4.775
Deviation from Regression	76	.88095	.01159	
Total	79	.98299		

The F statistic is significant at $p \leq .05$ so the hypothesis that STEP has no influence on retention can be rejected.

APPENDIX E
Special Action Admissions Criteria and Procedures

The Committee on Admissions and Enrollment authorized the Director of Admissions to admit by special action disadvantaged students with the following characteristics as of Fall 1979.

I. Freshmen if they fall into one of the following categories:

1. High School GPA $\geq$ 2.35 and no academic subject obmissions
2. " GPA $\geq$ 2.45 and subject omissions $\leq$ 1
3. " GPA $\geq$ 2.55 and subject omissions $\leq$ 2
4. " GPA $\geq$ 2.75 and subject omissions $\leq$ 3
5. " GPA $\geq$ 2.95 and subject omissions $\leq$ 4
6. " GPA $\geq$ 3.15 and subject omissions $\leq$ 5

II. Advanced standing students in the following categories:

1. Transfer GPA $\geq$ 2.5 with at least 36 transferable units
2. " GPA $\geq$ 2.7 with at least 24 transferable units

The Director of Admissions is authorized to admit students in the above categories if he believes that there is a reasonable chance that they will succeed at the University. In cases where he is in doubt, he refers these cases to the Subcommittee on Special Action Admissions. All special action applicants who do not meet the above criteria are referred to this Committee.

APPENDIX F

Enrollment Status After Five Quarters of EOP Special Action Freshmen Who Would Have Met Minimum Admissions Criteria

	Enrolled	Not Enrolled	Total
Group I (STEP A)	35	13	48
Group II (STEP B)	18	8	26